




# *In The Flow* WITH FLOOD CONTROL

A newspaper-based activity booklet

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Newspapers  
In Education   
THE ARIZONA REPUBLIC

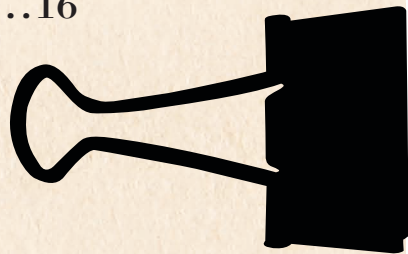






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# Floods

Floods are the most common natural disaster in the United States. They can occur at any time of the year, in any part of the country, and at any time of the day or night. Flood currents possess tremendous destructive power. Most lives are lost when people are swept away by flood currents.

Flooding happens during heavy rains, when rivers overflow, when ocean waves come onshore, when snow melts too fast or when dams or levees break. Flooding may be only a few inches of water or it may cover a house to the rooftop.

Floods that happen very quickly are called flash floods.

“Newcomers to the area are often surprised to learn that the desert holds immense potential for major flooding. Often, normally dry rivers, washes, and channels become raging rivers in minutes.”



## NEWSPAPER ACTIVITY:

Look at the Weather Page in The Arizona Republic to find a map of Arizona and locate Maricopa County. Can you name and locate any of the other counties in the state? Compare weather conditions in the various counties. Standard: SCo4-S6C3-06, 3SS-F1-PO1, 3SS-F2-PO1, 3SS-E4-PO1





## Monsoon Season

The amount of rain in Arizona varies from year to year, but one thing Maricopa County residents can rely on is the "Monsoon" season - July, August, and September. A monsoon is a heavy rainy season which lasts for several months.

In Arizona, the process starts with the hot and dry weather of May and June. Usually the winds are from a dry westerly direction, so humidity is low and temperatures soar above 100 degrees in the deserts. As the atmosphere warms, the jet stream moves northward. This allows the winds to shift and bring in the moisture. Most of our humid air comes from the Sea of Cortez and the Gulf of Mexico. Once the moist air arrives, the strong summer sun heats the moist air causing the familiar thunderstorm clouds.

“During the monsoon season, Maricopa County receives 32 percent of our normal yearly rainfall. The monsoon season is more than a nuisance. Loss of life, significant property damage, heavy rainfall, lightning, severe winds, dust storms, and flash floods are also associated with the weather event.”



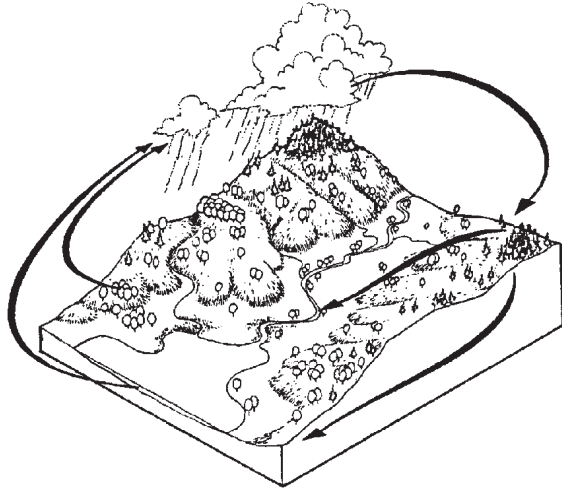
### NEWSPAPER ACTIVITY:

Search The Arizona Republic for articles, photos or advertisements that exemplify how important water is to our community. Make a class list of the many uses for water and discuss why it's crucial to keep water clean. Standard: SCo6-S4C1-01, SCo6-S4C3-02



## Water Cycle

The water cycle has been working for billions of years and all life on Earth depends on it continuing to work. The water cycle is the journey water takes as it circu-



lates from the land to the sky and back again. There are two forces which keep water moving – gravity, and heat from the sun. (The heat causes liquid water to evaporate or change into vapor (condensation) later, gravity causes the condensed water to fall down to earth!)

Precipitation is water that falls to the ground. We all know it as rain, snow, and hail. As the rain falls, some of the water lands in the trees, some lands on houses, and others land on the ground.

The water that makes it to the ground either soaks into the ground or runs off through the street or across the dirt until it reaches a wash, channel, or river. When the rain soaks into the ground, the water goes deeper and deeper into the ground until it finds itself in a big underground lake, called an aquifer.

The water that stays on the ground or gets trapped in the trees heats up from the sun's rays and dries up. It doesn't mean that it isn't there anymore. The water gets real hot and evaporates. Eventually, the steam becomes a water droplet in the sky, creating condensation and starting the water cycle all over again.



### NEWSPAPER ACTIVITY:

Pretend you are a reporter writing a story on the dangers of natural disasters. Inform the reader of safety precautions that can be taken in order to alleviate dangers caused by the precipitation stage of the water cycle. Standard: SC05-S3C1-01, SC04-S6C3-02, SC06-S6C2-01



## Channels

Flood control channels are built to carry stormwater safely to rivers and washes that criss-cross the state of Arizona, Maricopa County and the city or town where you live. There are many channels in the Phoenix area. Some are made of concrete and others are lined with grass or dirt such as the Indian Bend Wash in Scottsdale.

Alongside many flood control channels, there are paths where you can jog, ride your bicycle or walk your dog. In dry weather, grass-lined channels are safe places to play, in fact, many of them include parks or recreation features. However, move out of the channel if storms threaten. Flash floods can take you by surprise!



No matter what the weather is like, never enter a concrete-lined channel. They were built for flood control **ONLY** and are meant to carry large volumes of water at a high rate of speed. If you should happen to become trapped in a channel, look for a ladder or stairs built into the concrete walls and climb to safety.



### NEWSPAPER ACTIVITY:

Efforts are continually being made to increase safety measures in response to weather conditions. Read The Arizona Republic for the next few days to see if you can find an article portraying such efforts. Share your finding with the class and discuss how human awareness impacts the results of certain situations. Standard: SC04-S3C1-01





## Basins

Basins are another type of structure that prevent flooding. They are the large areas formed behind dams where stormwater collects before it is released through the dam into the flood control channels.

Many basins are used for parks and recreation because they are often dry. Like grass-lined flood control channels, it is safe to play in these areas when the weather is dry, but if storms threaten move out of the basin. These structures were built to collect stormwater - if you stay in a basin during a storm, you could be surprised by flash flooding.

“ A foot or two of water can cost you your life! Nearly half of all flash flood fatalities are automobile related. Two feet of water will carry away most automobiles and you can lose control of your vehicle in just six inches of water. Avoid walking through floodwaters, as water can sweep you off your feet. ”



### NEWSPAPER ACTIVITY:

Read The Arizona Republic for one week and clip out articles relating to dangerous weather conditions. Paste these articles in a notebook and write a paragraph about what could be done to stay safe for each condition. Standard: SC04-S3C1-02





## Word Search

### Flood Safety

The words in the list below can all be found in the diagram. The words read forward, backward, up, down, or diagonally. The words are always in a straight line and they never skip letters. Circle each word in the diagram as you find it, and cross it off the list.

```

D K N E I N I A R D R A T F L O O D
A A E N O O S U C E K U C M U S R T
M O M V A C O R V C S E R A E O I O
A F F I T P T I U C R O E L S T O E
G G L R C S R A O S T R E R A S V C
E N O O I U T E A S R V D R C A R N
L I W N O I T A V R E S N O C F E A
E N S M C D U C W E E R N U U E S R
N R O E A O P A S G N T A I R T E U
N A E N N I S L D T R T E I S Y R S
A W A T C H U I A O E E I T N A C N
H O U A T R R O L I T A S O R T B I
C A N A L B D E T E N T I O N E S U
    
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Basins  
Bridge  
Canal  
Channel  
Conservation  
Control  
Creek  
Dam  
Damage  
Detention

Drain  
Environment  
Evacuate  
Flood  
Floodplain  
Flows  
Insurance  
Levees  
Pour  
Prevention

Rain  
Reservoir  
River  
Safety  
Storm  
Warning  
Wash  
Watch



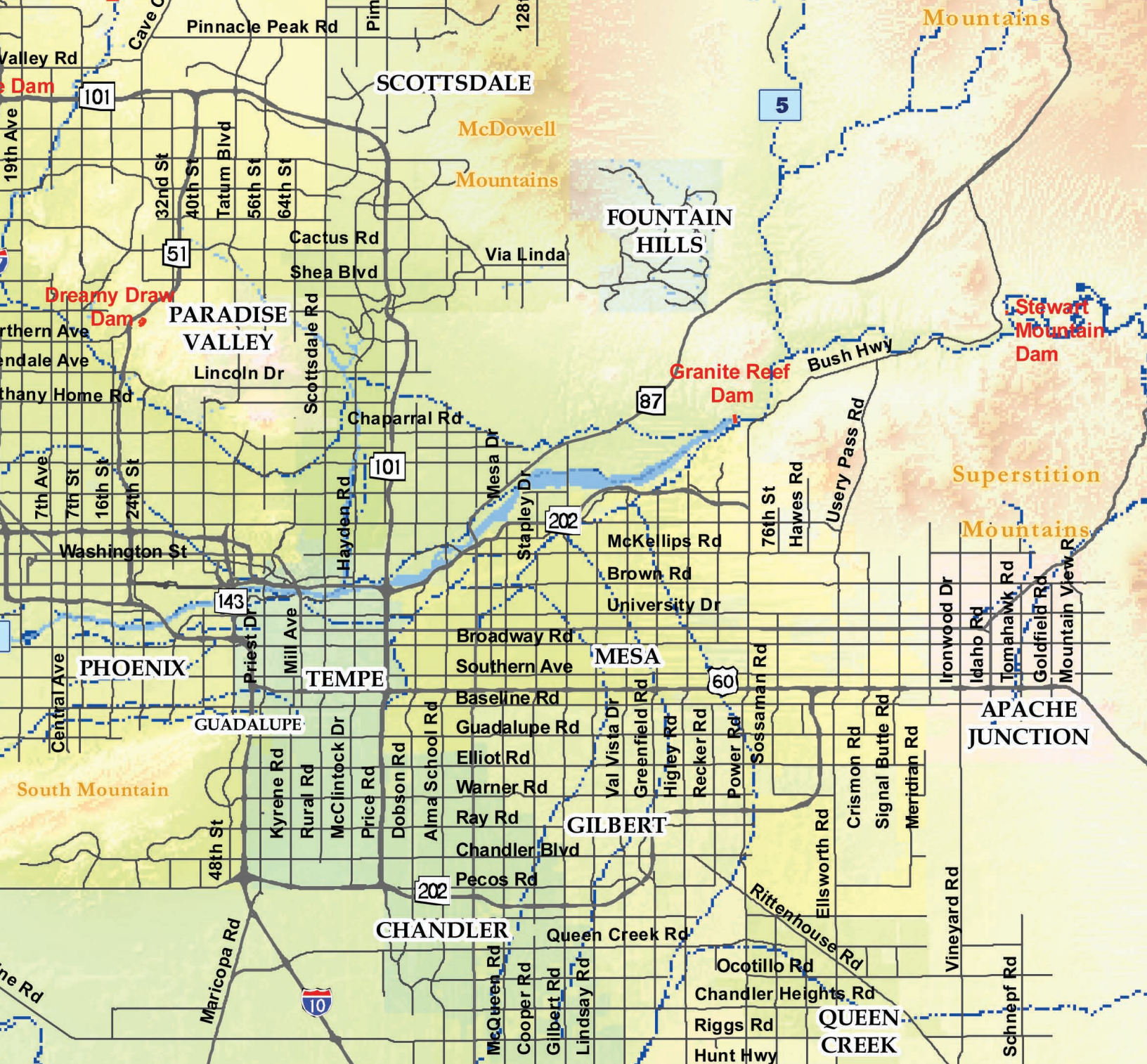
# Valley Map



## NEWSPAPER ACTIVITY:

- 1) Identify the five main rivers (they are numbered)
- 2) Using the mileage scale, determine how long the McMicken Dam is
- 3) On the border of what two cities do the Agua Fria River, Gila River and Salt River flow together?
- 4) Locate your home. What is the nearest river to your home? What is the nearest flood control structure?





Maricopa County is in the Gila River Watershed or Basin. The Gila River Basin covers more than half of the state of Arizona and also includes portions of New Mexico and Sonora, Mexico. Maricopa County, seated almost in the center of the Gila River Basin, acts as a drain for the state. More than half of the rain that falls in the state will travel through Maricopa County on its way to the Pacific Ocean.



## Washes

Washes are natural paths for water, like rivers or streams. These washes are dry most of the time, but heavy rains can fill them up with water very quickly.

It is never safe to cross a flooded wash! Do not try to walk through a flooded wash or ride a bicycle through it. Moving water can push you into danger, even if you are in a car.



When it rains in Maricopa County, flood control channels, rivers and washes quickly fill up with fast moving water. This can create a potentially life-threatening danger to anyone who gets caught or swept away.



### NEWSPAPER ACTIVITY:

Read The Arizona Republic to find an article that tells a story about someone using a safety measure to assist in a dangerous or life-threatening situation. Rewrite the story as if the safety measure never took place. End the story with a paragraph explaining how a different safety measure could have changed the situation. Standard: SCo6-S3C2-02



# Dams

A dam is a non-natural barrier which is 25 feet or more in height or capable of storing more than 50 acre feet of water. All of the District's dams are made of natural materials, like dirt and rock. The District does not have concrete dams such as those normally seen in narrow



gorges or canyons. Many of the dams the District operates and maintains are miles in length. They are designed to protect County residents from flooding from water that flows from mountain ranges in the area.

Maricopa County doesn't experience large flood events in this area on a regular basis, so these dams rarely hold large amounts of water and are considered "dry dams." However,

when floods happen, these dams must be ready at all times to operate safely and properly.

"Major rainfall events should not be the only concern of Maricopa County residents. Every year property is flooded somewhere in the county. Usually, flooding occurs when natural waterways, creeks, rivers, and washes cannot carry the flow of a large storm."



## Fun Flood Jumbles

odoslf \_\_\_\_\_  
 snomono \_\_\_\_\_  
 rweta \_\_\_\_\_

enlshcna \_\_\_\_\_  
 naisbs \_\_\_\_\_  
 sewhas \_\_\_\_\_





# Word Search

## Rivers, Washes, and Creeks

KNATEULBUCHANANZHTRONHSAWRETTAC S  
NEEASTFORKCAVECREEKLTAXPGWQULHYA  
AWMURWQLWDKEERCEVACILAINNETNECIP  
TROQCENIVEPARGHDXPLMKNODSWYOANGA  
DERWSALTMYRTLEAVEEWMARTINEZLDAQC  
NMGRASSNAMRETAWIEWORPLKSWPAILRSH  
ASAPMAYASSAHLTENTHSTREETKMALBBTE  
SUNDRIBGNIKCOMERWUSDOWPDINOAVEVN  
OHCECDFTGDMORSIWAEPFDTLTBWETSLEA  
ALIGLDSQYDRKULTRWPHWELYEAPTIZDRL  
BVTOTIEWTKDKOBVCHATAQBOVNYXCLPWDDL  
FLYINGEONLHYWBSNUGUWSWDWTPKLSAIEN  
ATRUEFDAIROPLAWOQYELLAVNOOMOTMSY  
QETWBVSMETZRWASH9REWSTYUIGPHRHIL  
DYEKCARDOPSNMHTHEYNHAPGBKNUKSPF  
SULACEWHNMAISTOLSWLBHSAWPDIGWATO  
VYTGDGOELDMRATBMPIOSLLIHARODNAWPU  
GEUUPDSWRTW10AITPWGUSZCTTWUEYUYRR  
RSOATYEEPRHWRTVEYRETEMECRLDVQAIT  
ALMFTETSES LAKJREDNEBHTVJSIWDSWTH  
NOARYAOTAPGWQBILLDKDRYBUXAPBTEOUO  
IODIWSTWJEXCREPPOCGJOKRPBVCULLDF  
TWNABAYAWCGAPUIFGODLAMYPATRVUTLVJ  
EFEKCVXRPNBNEVOCYNNUSUCARNPMBTAHU  
RGKSTRCDYCITNMKLIYTOPDKCLCRFIGRL  
EGCBNEIYHSHCRANOMTREC PJRYPHDLDAY  
ENICIDEMWOLLEYSLOGNIMODNASELTITIL  
FOMVBGSAIRPORTIEDLMBVCTULBRINENG  
SICMOOREGULCHF DONAMTRAHIPTBIGSBW  
LOMPURDRVMQSCOTTAVENUEOPLAUICNOL  
OCSPTREDVGS GNIRPSWOLLIWAKLOPTUWA  
SCOTTSDALEALLUVIALFANTKIAKONASPY

### Rivers:

Agua Fria  
Gila  
Hassayampa  
New  
Salt  
Verde  
Washes  
Airport  
Amir  
Andora Hills  
Apache  
Bender  
Blue Tank  
Buchanan  
Calamity  
Casandro

Casandro Wash,  
South Branch  
Cemetery  
Centennial  
Copper  
Dreamy Draw  
Echo  
Flying E  
Flynn Lane  
Fourth Of July  
Galloway Wash,  
Middle Branch  
Galloway Wash,  
Lower Branch  
Grapevine  
Granite Reef  
Grass  
Hartman

Hospital  
Indian Bend  
Jackrabbit  
Little Sandomingo  
Loudermilk  
Lower El Mirage  
Lower El Mirage  
Wash, Tributary  
Martinez  
McMicken Dam  
Outlet  
Mockingbird  
Monarch  
Moon Valley  
Moore Gulch  
Morgan City  
Myrtle Ave  
Ocotillo

Powderhouse  
Rainbow  
Rodeo  
Rowe  
San Domingo  
Sand Tank  
Sanokai  
Scatter Wash, North  
Scatter Wash, South  
Scott Avenue  
Scottsdale Alluvial  
Fan  
Sols  
Sunny Cove  
Sunset  
Tenth Street  
Trilby  
Waterman

Waterman Wash,  
West Prong  
Wash B  
Wash 9  
Wash 10  
Willow Springs  
Woolsey  
Yellow Medicine  
Creeks:  
Cave Creek  
Cline  
East Fork Cave Creek  
Little Squaw  
Queen  
Rodger  
Skunk  
Sycamore



# Tips to keep you safe during a storm

## Driving Safety

Use common sense when driving. When the weather gets nasty, slow down and put more space between you and other vehicles.

In dust:

- Do not enter a dust storm if it can be avoided.
- Turn headlights on and slow down to a prudent speed.
- If you pull off the road, get as far to the right as possible. Turn off the car and headlights, and set the parking brake. Keep your foot off the brake pedal or other drivers may think you're a car in motion.

In rain:

- Rain reduces traction and causes tires to hydroplane. Slow your speed accordingly.
- Water on roads may be deeper than it looks. Watch for vehicles traveling too fast, as they can throw up blinding sheets of water.
- Do not cross rain-swollen washes. You can be caught in a flash flood that can sweep your vehicle away.
- Pay attention to hazard signs and roadblocks. Ignoring them threatens life and property and can result in law enforcement action.

Stuck in a wash:

- Control of a vehicle is lost in six inches of water. Most vehicles begin to float in two feet of water.
- Call 911.
- Climb onto the roof and wait to be rescued.
- If water is still low, wade to safety, but beware of floating debris.





## Tips to keep you safe during a storm

### Outdoor safety

Lightning is attracted to metal and water and tends to strike the highest or tallest objects.

- You are in the lightning strike zone if you hear thunder five seconds or less after seeing lightning.
- Avoid wide open areas such as fields and golf courses.
- Stay off hilltops and other high points of land.
- Avoid metal objects such as golf clubs or lawn mowers.
- Stand at least seven feet away from tall objects.

If you are caught in the open:

- Get to the lowest point of ground and kneel or squat to minimize contact points with the ground.
- Do not lie flat. This will make you a bigger target.
- Do not huddle with others. Spread out at least 15 feet apart.

If you encounter a downed power line:

- Stay at least 100 feet away.
- If the power line has fallen on your car while you are in it, do not touch anything metal in the car and stay inside until professional help arrives.
- Never try to help someone trapped by a power line; you will endanger your own safety. Instead, call 911 immediately.



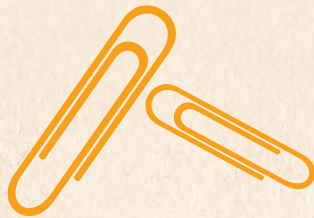
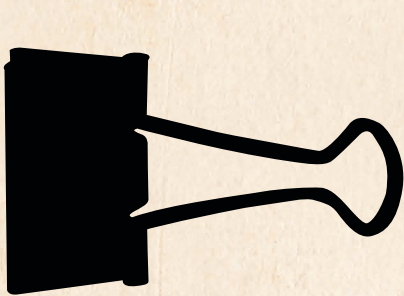


## Tips to keep you safe during a storm

### Indoor safety

Although you are safer indoors than out in the open, wind and lightning are still forces to be aware of. During a storm:

- Turn off all utilities at the main switch and close the main gas valve.
- Stay away from windows during strong winds. Tree limbs and other wind-borne objects can be hazardous.
- Electrical wiring attracts lightning. Avoid using the telephone, except in emergencies.
- Lightning can move through a home's plumbing, attracted to the metal or water, so avoid using sinks and showers.
- Disconnect computers, televisions, and other delicate equipment that is not surge protected.
- Secure outdoor furniture and other objects that can become missiles in strong winds. Keep trees trimmed and stake weaker trees.





# Glossary

**Arroyo:** A deep gully cut by an intermittent stream; a dry gulch.

**Basin:** Any bowl-shaped depression in a land or ocean floor surface.

**Caliche:** (Ka-leech-e) In the Southwest United States, gravel, sand, or desert debris cemented by porous calcium carbonate; also the calcium carbonate itself.

**Dam:** an artificial barrier which is 25 feet or more in height or capable of storing more than 50 acre-feet of water.

**Dike and Levee:** An embankment, usually of earth-fill, constructed to control or confine water.

**Ecology:** A branch of science concerned with the interrelationship of organisms and their environments; the totality or pattern of relations between organisms and their environment.

**Flash flood:** A sudden increase in river discharge and overland flow due to a violent rainstorm in the upper river basin.

**Floodplain:** The broad, flat valley floor of the lower course of a river, planed by annual flooding and by the side-ways and downstream movement of meandering water.

**Flood watch:** A flood watch is issued when weather conditions indicate flash flooding may occur, but has not yet taken place.

**Floodway:** A large capacity channel constructed to divert floodwaters or excess streamflow from populous or damageable areas; the part of a floodplain kept clear of encumbrances and reserved for emergency diversion of floodwaters.

**Groundwater:** Water held in the bedrock of a region, having percolated through the soil from the surface. Such water is an important resource in areas where surface water runoff is limited or absent.

**Riparian:** Relating to living or located on the bank of a natural watercourse (as a river) or sometimes of a lake or a tidewater.

**River:** A large natural stream of water emptying into an ocean, lake, or other body of water.

**Run off:** The portion of the precipitation on the land that ultimately reaches streams, especially the water from rain or melted snow that flows over the surface.

**Rural:** Of or pertaining to the country as opposed to the city. It implies a contrast to urban.

**Sediment:** The material resulting from the weathering and erosion of the landscape, which settles to the bottom of a liquid.

**Topography:** The composition of the visible landscape, comprising both physical (relief, drainage, vegetation) and human (roads, railways, settlements) features.

**Tributary:** A stream or river flowing into a larger stream or river.

**Urban:** Pertaining to, located in, or constituting a city.

**Wash:** The dry bed of a stream.

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*Joe Munoz*

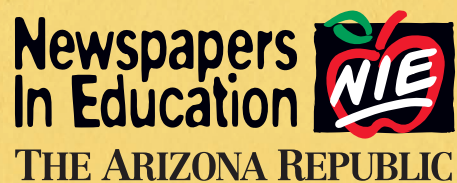
at 602.506.1501 or  
[jfm@mail.maricopa.gov](mailto:jfm@mail.maricopa.gov)







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